Offsets and Water-Use Efficiency

MA Smart Growth Conference

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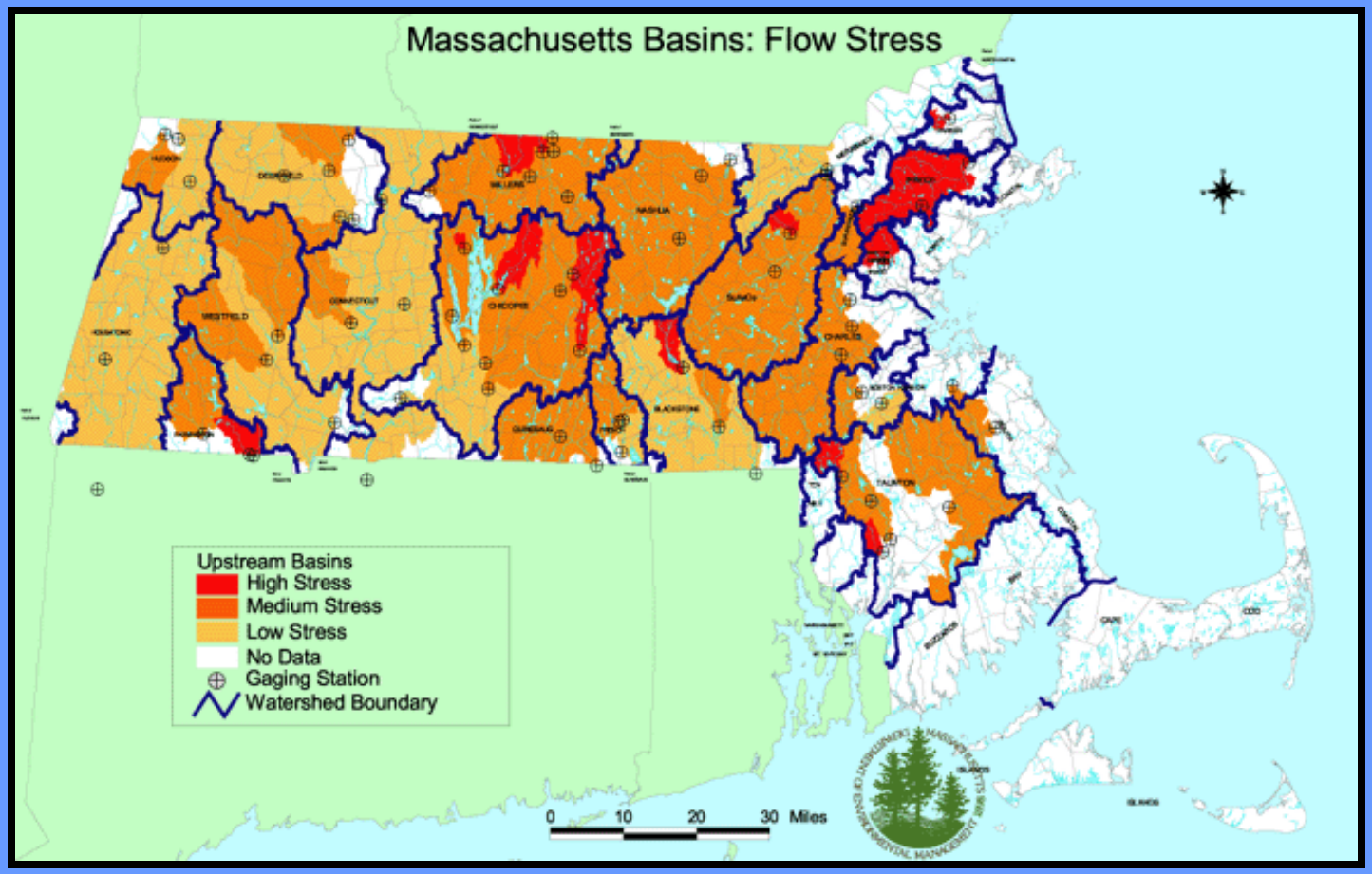
Goal: Wise & Balanced Water Use

- More protection of our stressed water resources through implementation of conservation measures
- Reduce nonessential water use
- Apply higher Performance Standards to increases in water use
- Mitigate increases in water use where feasible

Stressed Basins



- 16 High Stress
- 36 Medium Stress
- 18 Low Stress
- Unassessed: mostly coastal basins

Source: Water Resource Commission stressed basin report (2001)

http://www.mass.gov/dcr/waterSupply/intbasin/stressed_basins.htm

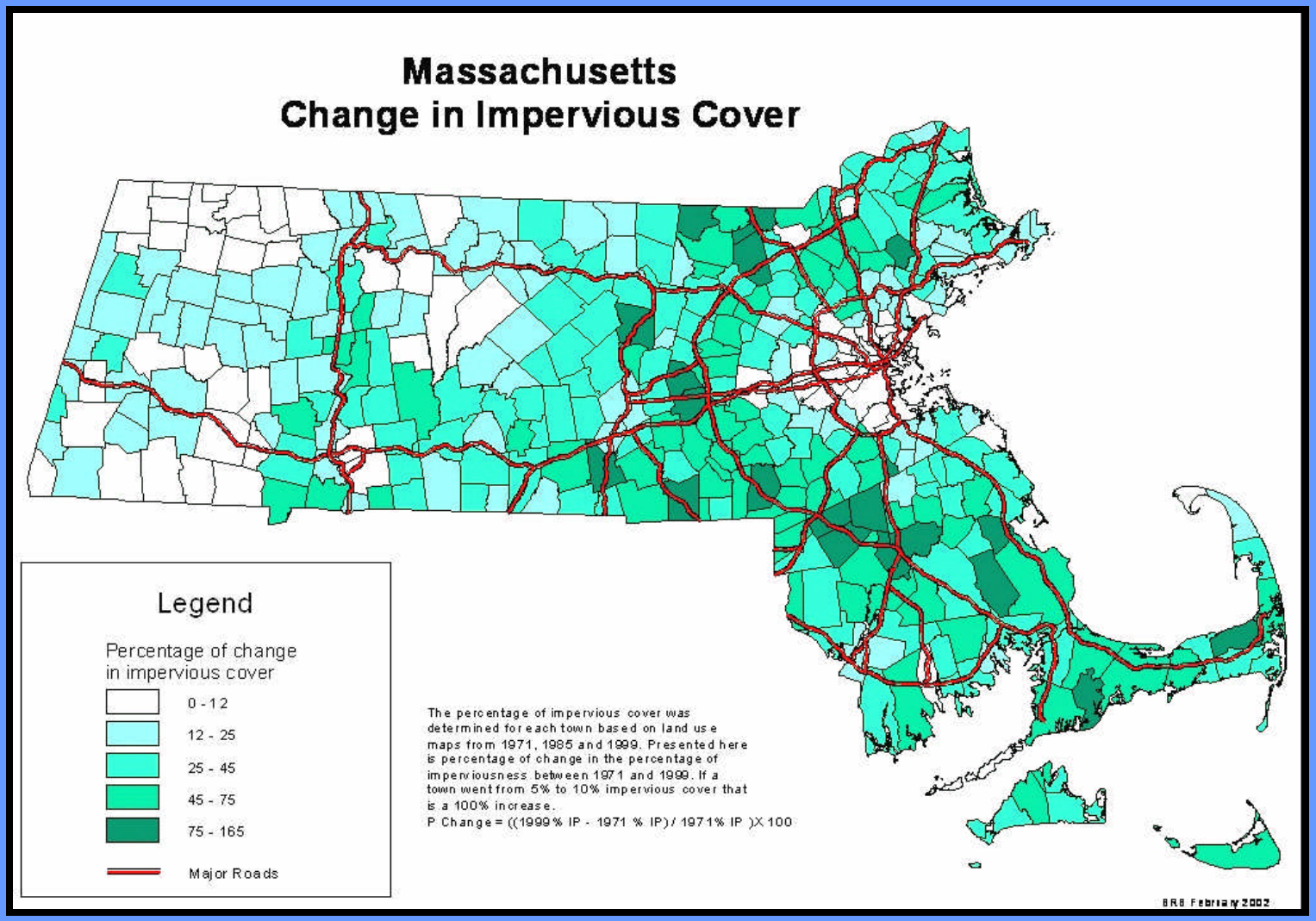
Based on USGS subbasin stream gages

Guidance Document for Water Management Act Permitting Policy

- Permit, Permit Amendment Applications, and 5-Year Reviews
  - Guidance # BRP/DWM/DW/G05-01
  - (Supersedes Guidance # BRP/DWM/DW/G04-1)
  - Effective Date: January 17, 2006

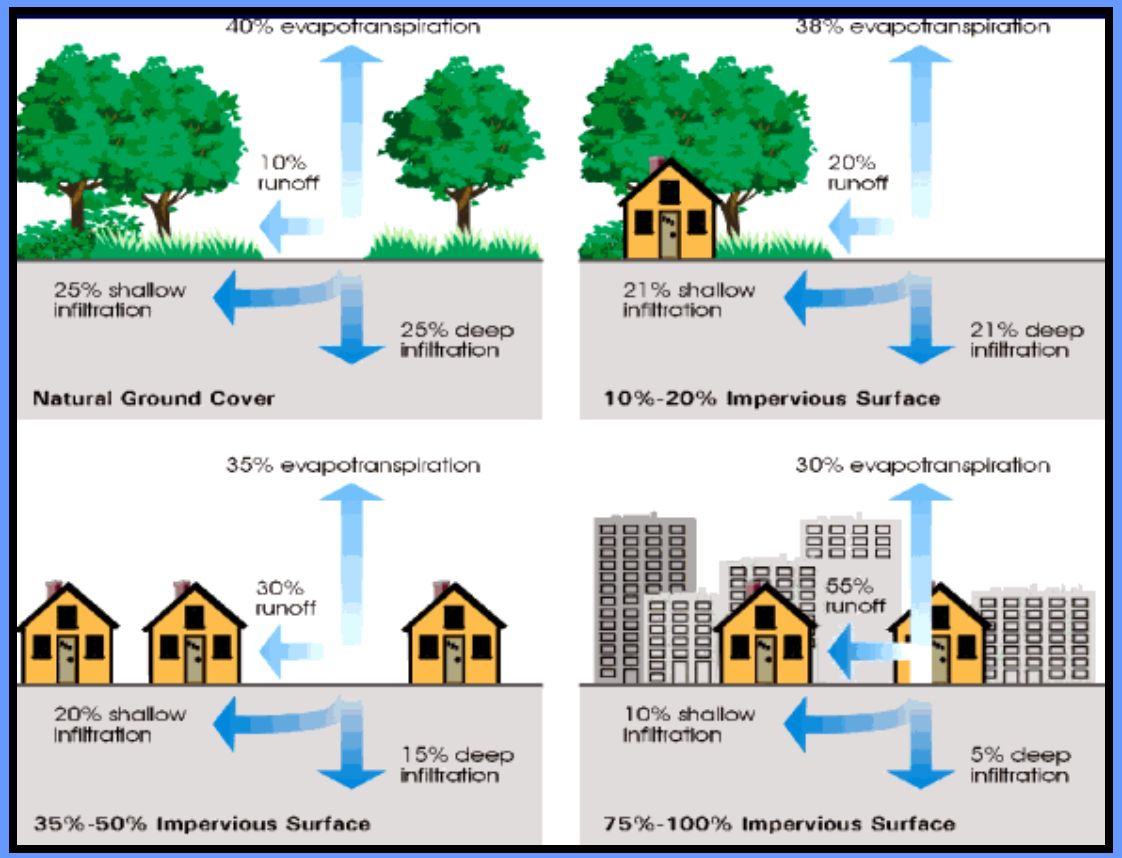
- This Guidance applies to all DEP permits issued, modified, or renewed under the Water Management Act on or after the effective date of this Guidance

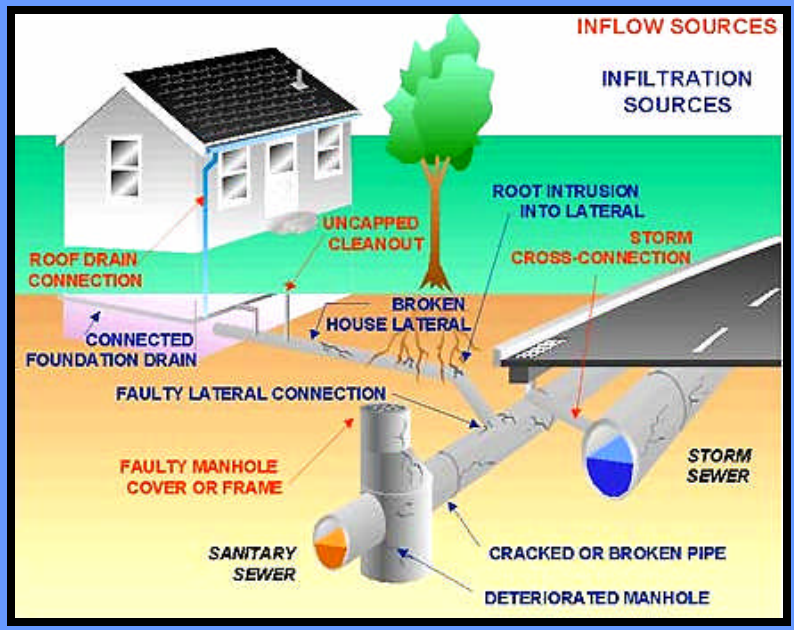
Watershed Urbanization



Loss of Groundwater Recharge

Stormwater runoff





Infiltration and inflow

Growing Water Demands

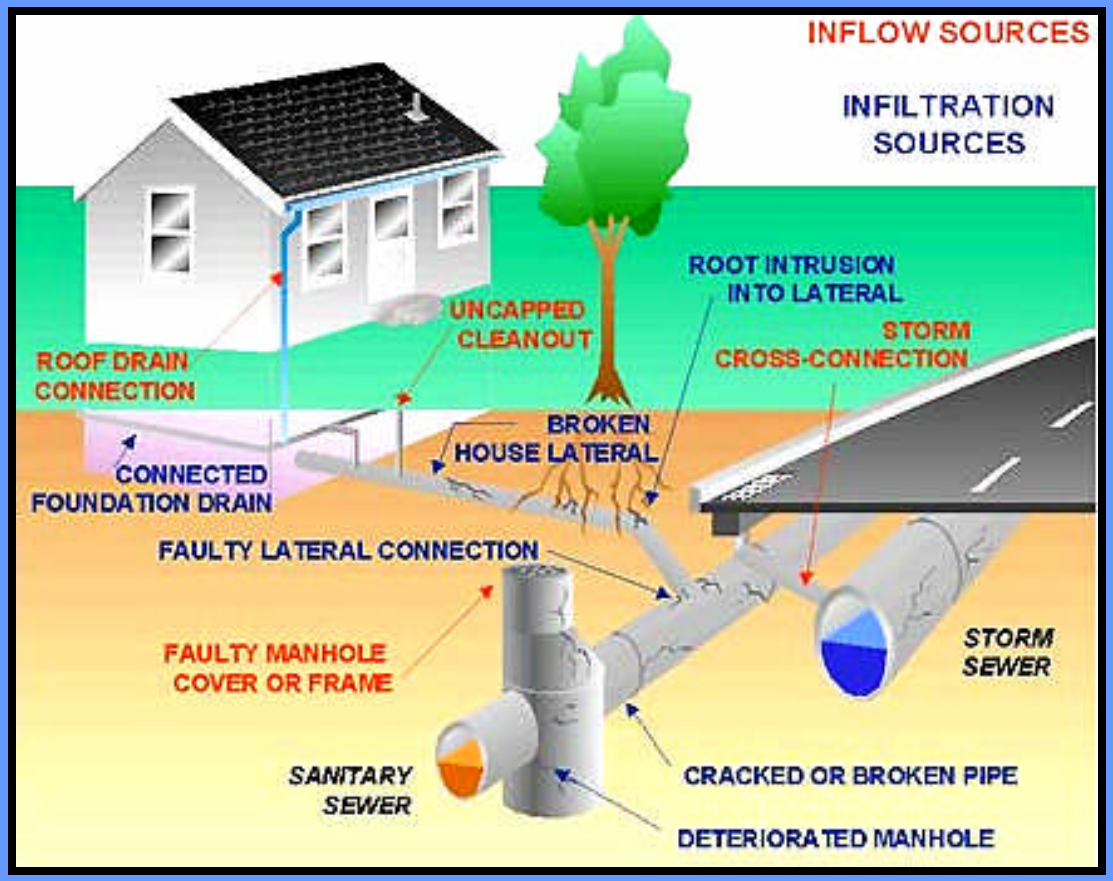
What are Offsets?

- Measures that return water to the basin or prevent water loss from a basin
- Offsets may include:
  - Stormwater recharge
  - Wastewater return/reuse
  - Infiltration and inflow removal
  - Private well regulation
  - Best Management Practices:
    - Water conservation programs
    - Low Impact Development bylaws
    - Bylaws that regulate land clearing, impervious cover, topsoil, automatic sprinkler systems
    - Source optimization plans
    - Water banking

Offsetting Withdrawal Increases

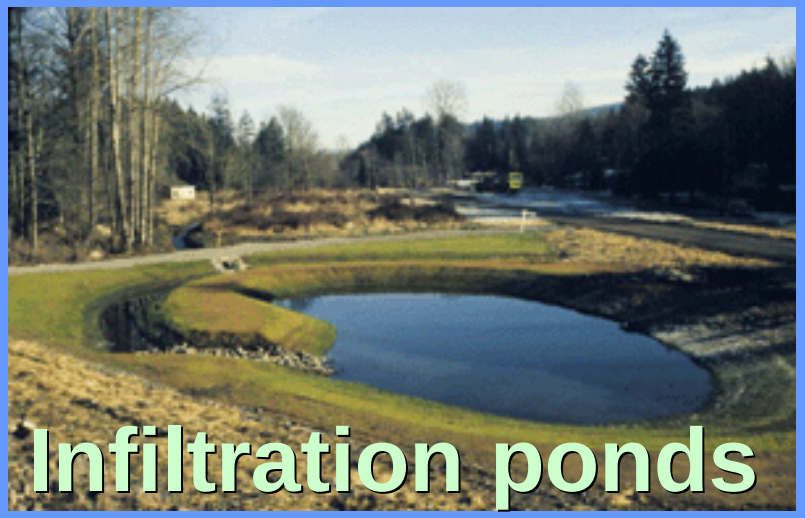
- Required in High & Medium Stressed Basins
- Offset Feasibility Study and Implementation
  - (Baseline Use = previous 3 year average, most recent year or registered volume, which ever is higher)
  - High Stress: conduct study after one full year
  - Medium Stress: conduct study after 2nd full year
  - 60 days from ASR submit study scope
  - 6 months from DEP approval of Scope submit Study
  - After 60 days either submittal is presumptively approved
  - Implement Study upon exceedence of baseline in any future ASR

Reduction of Sewer Inflow and Infiltration



- Fix decaying and broken pipes
- Eliminate roof drain and sump pump connections to sewer
- Repair or replace faulty manhole covers

Stormwater Management



Water Re-Use – Municipal Systems

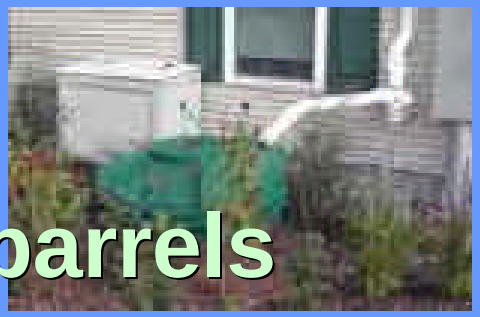
- Use of Treated Sewage Effluent
  - Golf Course Irrigation
  - Municipal Landscaping
  - Water features

Low Impact Development

Rain gardens

Permeable pavement

Rain barrels



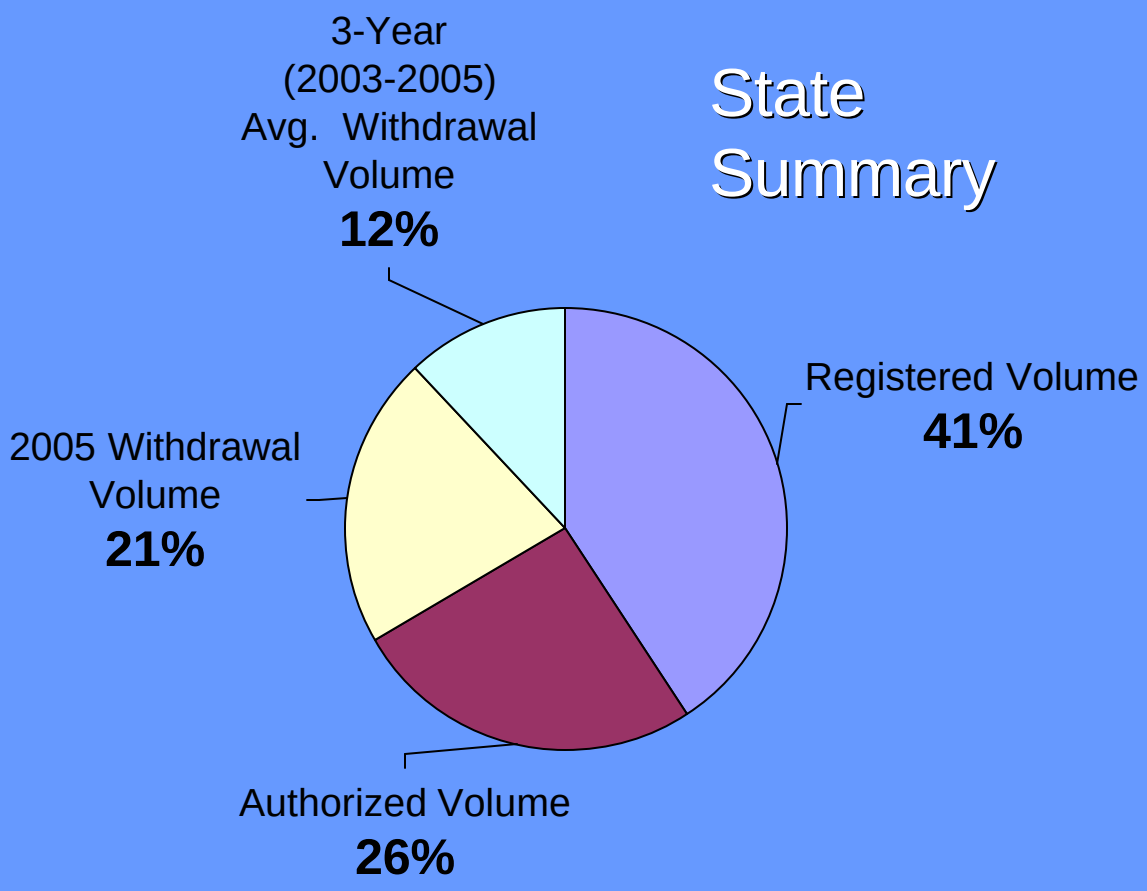
Green roofs

Vegetated swales

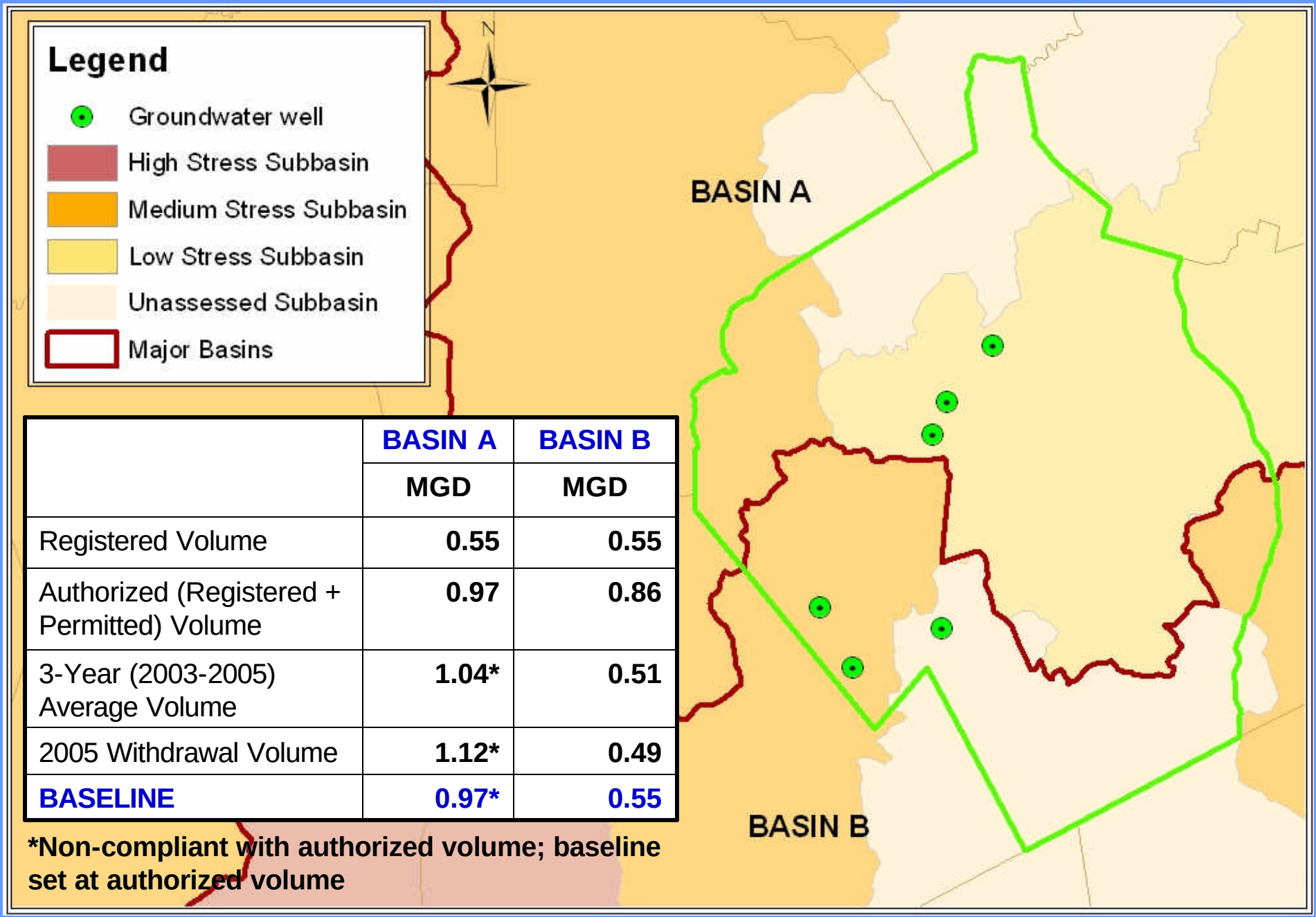
Baseline

- Highest of:
  - Registered Volume
  - 3-Yr. (2003-2005) Average Withdrawal Volume
  - 2005 Withdrawal Volume

  (in compliance with WMA policy)
- Offsets are required for authorized withdrawals above baseline



Example Baseline Calculation—Town in Multiple Basins



	BASIN A	BASIN B
	MGD	MGD
Registered Volume	**0.55**	**0.55**
Authorized (Registered + Permitted) Volume	**0.97**	**0.86**
3-Year (2003-2005) Average Volume	**1.04***	**0.51**
2005 Withdrawal Volume	**1.12***	**0.49**
BASELINE	**0.97***	**0.55**

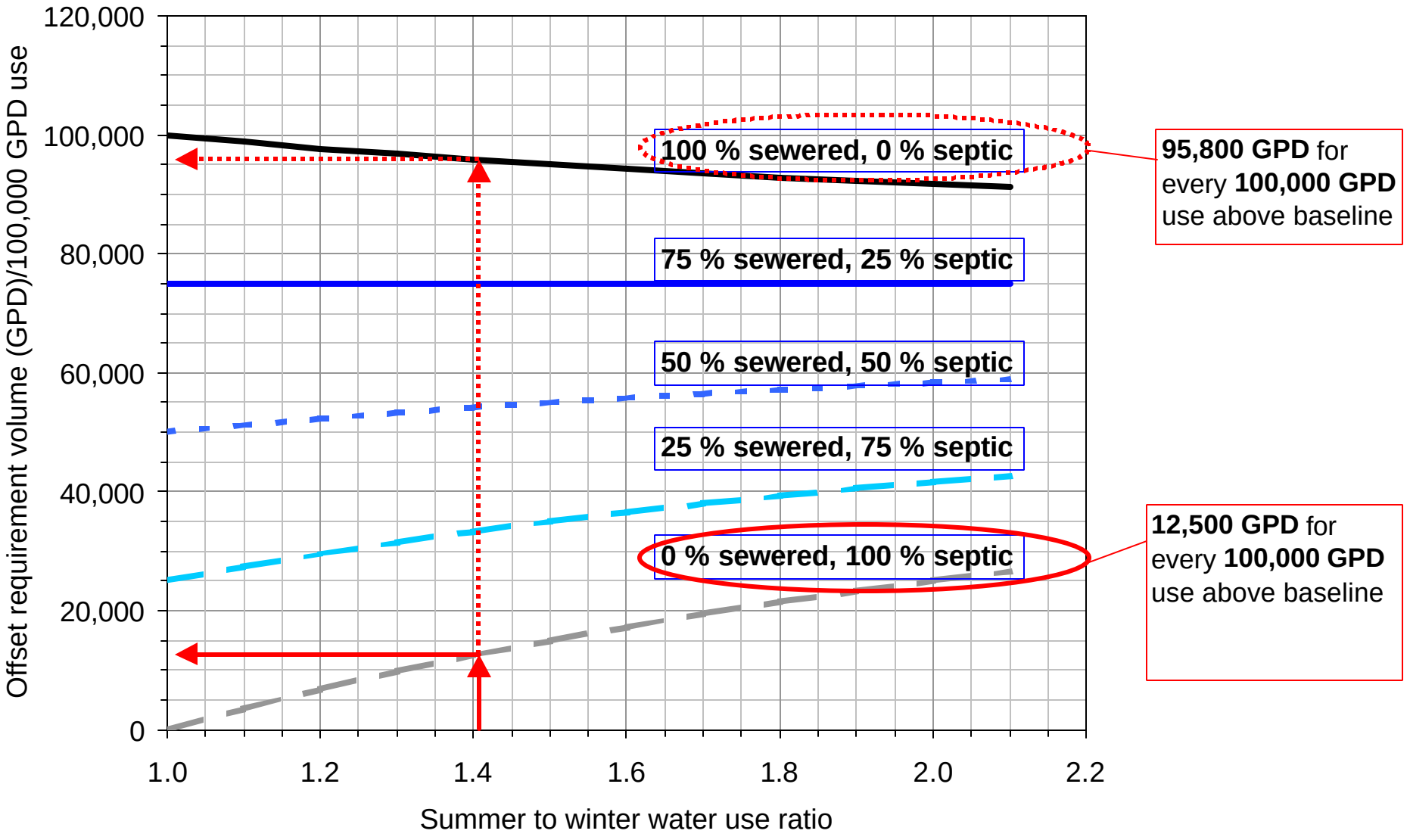
***Non-compliant with authorized volume; baseline set at authorized volume**

Offset Requirement Volume

- **Based on**
  - Authorized withdrawal volume in excess of baseline
  - Summer to winter water use ratio
  - Percent of town on sewer or septic system
  - Location of discharge points

- **Assumptions**
  - Difference between summer water use and winter water use is due to outside uses
  - 75 % of outside water use in summer is lost to evapotranspiration (ET)
  - Sewer systems: all indoor water use and outside water lost to ET must be offset
  - Septic systems: all outside water lost to ET must be offset

Offset Requirement Volume



Offset Credits

- Offset credit is applied toward the reduction of the offset requirement volume
- Potential “measurable” credits:
  - Private well regulation
  - Infiltration and inflow (I/I) reduction
  - Stormwater recharge
- To receive proper credit, each practice must be feasible for the town to implement

Offset Credit: Private Well Regulation

Private well offset calculated from:

- Summer and winter water use
- Number of service connections reported in ASR
- Number of private wells

Assumptions:

- Reduction in summer use by 20% (winter use assumed the same)
- Private well use is same as public supply

Calculation:

- Based on 2001-2003 ASR data for 14 towns:

  Avg savings/well = 33 GPD

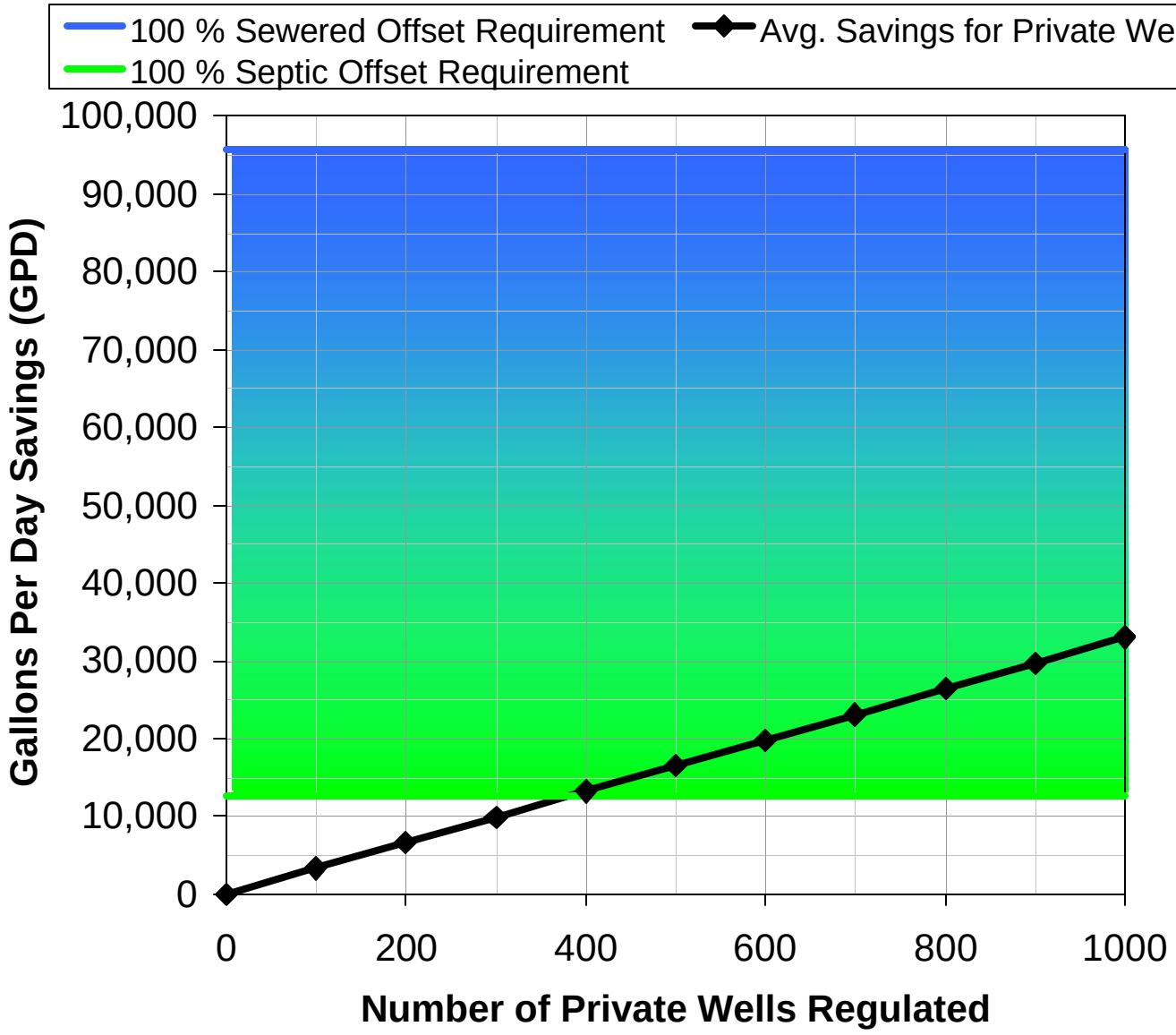
  Minimum = 23 GPD

  Maximum = 42 GPD

Problems with accounting approach:

- Don’t know actual use volumes or patterns
- Difficulty in regulating—meter wells? How to enforce?

Offset Credit-Private Well Regulation



- **Avg savings per well =**

  33 GPD/well

- **Offset requirement based on:**
  - **100,000 GPD use above baseline**
  - **summer to winter water use of 1.4**
  - **% of town sewered**

Offset Credit: Inflow and Infiltration Reduction

Background:

- MWRA estimates of I/I for 1998, 2002, 2003 cover wide range
  - Inflow ranged from 3 to 29 % of avg. daily sewer flow
  - Infiltration ranged from 17 to 68 % of avg. daily sewer flow

Problems with accounting for I/I:

- Difficult to measure I/I and estimate potential offset reductions
- Highly variable, depending on
  - Location (proximity to wetlands, low-lying areas)
  - Age of system
  - Storm events
  - Soil types
- What is an achievable offset goal—minimum from a group of towns, average, 20 % reduction?
- Time frame for achieving goal (one year?, 5 years?, 10 years?)

Summary

- Current WMA guidance document requires offset feasibility study to be conducted when withdrawals exceed baseline
- Offset requirement volume determined from withdrawals in excess of baseline, summer to winter water use, percent sewered/septic, and location of discharge points
- Accounting approach would assign credits to BMPs and other practices with goal of reducing offset requirement volume to zero
- Alternative approach? Implement a number of BMPs without tracking credits